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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/774,952

02/09/2004

Qing Ma

884.804US2

8635

21186

7590

07/09/2008

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.

P.O. BOX 2938

MINNEAPOLIS, MN 55402

EXAMINER

DIAZ, JOSE R

ART UNIT

PAPER NUMBER

2815

NOTIFICATION DATE

DELIVERY MODE

07/09/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

<b>Office Action Summary</b>	<b>Application No.</b> 10/774,952	<b>Applicant(s)</b> MA ET AL.	
	<b>Examiner</b> JOSE R. DIAZ	<b>Art Unit</b> 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,8-10,23-26 and 30-37 is/are pending in the application.
- 4a) Of the above claim(s) 8-10,23-26 and 30-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4 and 34-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3-4 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wachtler et al. (US Pat. No. 6,274,391 B1) in view of Watson et al. (US 5,168,926).

Regarding claim 1, Wachtler discloses a microelectronic package, comprising:

a heat spreader (12) [please note that substrate 12 can be considered as a heat spreader because: a) it is made of metal, and b) it can be formed with heat slugs to facilitate heat dissipation. See col. 8, lines 40-41 and 45-46] having a first surface, said heat spreader having at least one recess (14) defined therein by at least one sidewall extending from said heat spreader first surface to a recess bottom surface [see fig. 21];

at least one microelectronic die (16) disposed within said at least one recess (14), said at least one microelectronic die having an active surface (top surface), a back surface, and at least one side [see fig. 21];

a thermally conductive material (adhesive) to secure the die (16) within cavity (14) [see col. 8, lines 55-57]; and

build-up layers (24, 32, 34) disposed on said microelectronic die active surface and said heat spreader first surface [see fig. 21].

Wachtler essentially discloses the claimed invention except for showing a thermally conductive material adhering said at least one microelectronic die back surface to said recess bottom surface.

Watson teaches a die (28) secured within recess (24) of heat sink (10) by a thermally conductive material (26) [see figs. 1 and 4 and col. 2, lines 65-67].

With regards to claims 34-35, Watson teaches a thermally conductive epoxy that is deformable in the uncured state (26) [Col. 2, lines 65-67]. With regards to the resin limitation recited in claim 34, one of ordinary skill in the art recognizes that all epoxies are resin products; hence it is inherent that the thermally conductive epoxy in Watson is also a resin.

Wachtler and Watson are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to show a thermally conductive material between the microelectronic die back surface and the recess bottom surface of the device taught by Wachtler. The motivation for doing so, as is taught by Watson, is to minimize the conductive path between the integrated circuit and the heat spreader (col. 1, lines 19-21). Therefore, it would have been obvious to combine Watson with Wachtler to obtain the invention of claims 1, 3-4 and 34-35.

Regarding claim 3, Wachtler further discloses that said build-up layers comprise at least one dielectric layer (24) abutting said at least one microelectronic die active

surface and said heat spreader first surface and at least one conductive trace (32, 34) disposed on said at least one dielectric layer [see fig. 21].

Regarding claim 4, Wachtler further discloses that said at least one dielectric layer (24) is disposed within gaps between said at least one recess sidewall and said at least one microelectronic die side [consider the space formed between die 16 and substrate 12, which is filled with layer 24. See fig. 21 and col. 9, lines 1-3].

3. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wachtler et al. (US Pat. No. 6,274,391 B1) in view of Watson et al. (US 5,168,926), and further in view of Shibamoto et al. (US Pat. No. 6,563,212 B2).

Regarding claims 36-37, a further difference between the prior art and the claimed invention is a thermally conductive material made of a metal or metal alloy.

Shibamoto teaches an adhesive (2) made of metal or metal alloy [col. 4, lines 25-39, and col. 8, lines 18-19].

Wachtler, Watson and Shibamoto are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include an adhesive made of a metal or metal alloy. The motivation for doing so, as is taught by Shibamoto, is to reduce the thermal resistance between the chip and the heat spreader so that a high heat radiation characteristic can be obtained (col. 8, lines 18-24 and 31-32). Furthermore, the court has held that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of

obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960); *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to combine Shibamoto with Wachtler and Watson to obtain the invention of claims 36-37.

### ***Response to Arguments***

4. Applicant's arguments filed March 31, 2008 have been fully considered but they are not persuasive.

a. ***Citing Watson does not constitute an admission that the argued limitation is missing from Wachtler***

As stated in several previous Office actions, Wachtler teaches using an adhesive for directly attaching the bottom surface of a semiconductor device to a substrate. For example, Wachtler states “[s]emiconductor device **16** is secured within cavity **14** of substrate **12** by adhesive” (Emphasis added) [column 8, lines 53-55]; wherein the adhesive is deposited “into said cavity before said semiconductor device is placed in said cavity” (Emphasis added) [column 13, lines 63-65]. One of ordinary skill in the art recognizes that Wachtler is clearly describing a conventional technique in which an adhesive is used for attaching at least the rear surface of a semiconductor device to a substrate. <sup>1</sup>

However, applicant is reluctant to acknowledge these teachings, despite the fact that Wachtler discloses the argued limitation, and the art recognizes that such teachings

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are conventional. For this reason, the examiner cites Watson in the last rejection, to further show applicant that the technique, as described in Wachtler, is simply a very well known technique which is conventionally used in the art to attach semiconductor devices to a substrate. Thus, the examiner is not making an admission that the argued limitation is missing in Wachtler. But to the contrary, the examiner is reaffirming his position that the argued limitation is conventionally known in the art.

b. **Wachtler does not teach away from Watson.**

In attempt to discredit the cited prior art references, it is noted that applicant attacks the references individually. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, applicant argued that the cited references teach away from each other. However, this argument is moot because Watson, as stated previously, is simply describing the same conventional technique for attaching a semiconductor device to a substrate that Wachtler describes and is relying on for his invention. Please note that the combination of references makes clear that using an adhesive for attaching at least the rear surface of a semiconductor device to a substrate is not novel. Therefore, Wachtler does not teach away from Watson. As such, the rejection is considered to be proper.

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<sup>1</sup> Other exemplary prior art references also describing such conventional technique can be found on page

### ***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

### ***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSE R. DIAZ whose telephone number is (571)272-1727. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jerome Jackson Jr./  
Primary Examiner, Art Unit 2815

/J. R. D./  
Examiner, Art Unit 2815